A CAHNERS PUBLICATION

INTERNATIONAL EDITION/JULY 1, 1989

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

THE SELLING OF I.S.

Users Are Offering Their IS Expertise for Sale. But at What Price?

Also in This Issue:

How To Reap a Harvest With CASE

DEC Goes Back to the OLTP Drawing Board

Data Encryption Is a Secret No More

The Liabilities of Working at Home

JULY 1, 1989

VOLUME 35
NUMBER 13

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

The Selling of IS 22

BY RALPH EMMETT CARLYLE For some, they are just amateurs playing business games. But for others, they personify a trend. The trend is IS shops selling their software and management services—in a word, their expertise—to competitors, as well as to their own suppliers, on a scale heretofore unknown. But the big question is: do these IS spinouts run the risk of giving away too much?

Spinout Advice From One IS Veteran 24

Three Models for Spinning Out 26

Cover Photography by Curt Berner

DEPARTMENTS

Inside DATAMATION 10

Letters and Access 12

Look Ahead 17
General Motors' corporatewide computer project will rely on a forthcoming graphics standard called Product Data Exchange Specification.

New Products 66
Sun Microsystems has expanded its RISC-based systems offerings with a desktop computer and a workstation series.

Opinion 69

Planner 69

Information Economics 70

Career Opportunities 72

Ad Index 80

Company Index 80

SOFTWARE

CASE
Reaping CASE Harvests 31
BY MARCUS LOH AND R. RYAN NELSON A University of Houston study finds small software projects a fertile field for CASE tools. However, the adequacy of current tools for complex software development is by no means widely accepted.

DBMS
Tracking the Wild Data Base 37
BY TOM MCCUSKER Data base monitoring and SQL optimization tools are finding a place in those DB2 data base shops where production applications compete with ad hoc queries for precious system resources.

SYSTEMS

PCs
Can Stand-Alone EISs Stand Up? 41
BY STEPHEN G. DAVIS A handful of micro-based programs, loosely referred to as hypertext, are being used by IS and non-IS developers to change the look of a few high-profile executive information systems. But will they keep executive users satisfied?

A Word About Hypertext 42

Some Leading EIS Suppliers 44

MAINFRAMES
Loyalties Under Fire 49
BY DAVID STAMPS Control Data Corp. Cyber users, anxious over the company's continuing financial difficulties, are focusing on maintaining state-of-the-art operating system and application software.

COMMUNICATIONS

SECURITY
A Secret No More 53
BY SUSAN KERR Data encryption, an intriguing notion just a few years ago, is getting a second look from corporate security managers. Lower encoding costs and a greater fear of viruses are putting new impetus behind an old standard.

The Origins of an Encryption Standard 54

OLTP
Back to the Drawing Board 57
BY GARY MCWILLIAMS Digital Equipment Corp.'s first steps in the on-line transaction processing arena have resulted in a few falls, but the company has picked itself up and is planning to get under way again.

MANAGEMENT

PERSONNEL
Working at Home 63
BY JOHN W. OWEN Having employees, such as programmers, work at home can leave a company open to additional liabilities, but the biggest risks can be eliminated with a few easy measures.

Liability Is Not the Only Problem 64

INTERNATIONAL

Special supplement, not included in all issues **68-1**

▲49

▲63

The Spread of the Entrepreneurial Spirit

There's nothing quite like the power of an idea. An idea can neither be confined nor possessed. It has no sense of loyalty. And it cannot experience pleasure or pain. But when an idea takes hold in the minds of people, it can become more powerful than an atomic bomb, with consequences even more far reaching. Just witness what the idea of freedom has meant, and how as you read this it is changing cultures, political systems, even whole nations. Recent events in the Soviet Union are a case in point.

In our industry, the idea is spreading that the information systems function can do more than it has before. And if what we've seen so far is any indication, that idea is spreading fast. The "more" in this instance is selling the accumulated expertise of a company's internal IS organization on the open market. Whether it is incorporated in software or a service like facilities management, this expertise is being leveraged by IS departments any way they can.

Photograph by Peter Sylvia/Blackstar

SENIOR WRITER CARLYLE: Probing the spirit of entrepreneurial IS managers

But the reasons that IS executives get into the business of selling IS expertise are certainly not monolithic. As senior writer Ralph Emmett Carlyle writes in this issue's cover story, "The Selling of IS," page 22, "For some, they are just techies: amateurs playing business games. . . . For others, they personify a trend in which centers of innovation have shifted from vendors to customers and are seen as a vital link in the industry's evolution. . ."

For Carlyle, who has been writing about information systems in DATAMATION for 13 years, the trend provides an opportunity to offer insights about the changing nature of the IS function and the role of the people running it. Solving problems may be rewarding, he says, but there are other motivations as well. Using IS to generate revenue and profit for a company, and therefore changing the perception that the IS organization is solely a cost center, is also a powerful idea.

Carlyle is quick to point out, however, that sometimes the rush to embrace the entrepreneurial spirit can be a reaction to reversals in a company's core business or a result of the industry's downsizing trend. Moreover, such a new role may not be easy to manage, particularly if a company runs the risk of selling expertise that has served to differentiate it from its competition.

CASE and Spreadsheets

Much has been written about the need for and benefits of computer-aided software engineering (CASE), but a recent University of Houston survey homes in on the actual effect CASE has on programmer productivity. Based on a survey of actual usage at 12 companies, our article, "Reaping CASE Harvests," page 31, tells where CASE has been effective and what the training and implementation challenges are for this important technology.

David R. Brousell, Executive Editor

DATAMATION

Editor-in-Chief Tim Mead
Executive Editor David R. Brousell
Managing Editor Steve Paul
Senior Editor Linda Runyan
International Editor Paul Tate
Senior Writers Ralph E. Carlyle, Jeff Moad
Section Editors Marsha Johnston Fisher, Gary McWilliams
Assistant Editor/New Products Jane Majkiewicz
Production Editor C.J. Korisky
Assistant Production Editor Samantha Shubert
Copy Chief Andrea Ovans
Copy Editor Lauren Gibbons
Senior Art Director Chris Lewis
Associate Art Director Mike O'Leary
Staff Artist David Gordon
Editorial Assistants Nancy M. Gregory (Newton), Lauren Murphy (London)

Bureau Managers
Boston Gary McWilliams
Dallas Robert Francis
London Paul Tate
Los Angeles Tom McCusker
New York Parker Hodges
San Francisco Jeff Moad
San Jose Susan Kerr
Washington Willie Schatz

Foreign Correspondents
Eastern Europe David Hebditch (Leeds)
France James Etheridge (Paris)
Italy Janette Martin (Milan)

Contributing Editors Joseph Kelly, Fred Lamond, Hesh Wiener

Advisory Board Joseph Ferreira, John Imlay, Angeline Pantages, Russell Pipe, Carl Reynolds

Publisher/Vice President Donald E. Fagan
Associate Publisher William Segallis
Marketing Com. Director Kathy Doyle
Production Supervisor Jim Fuss
Production Assistant Mary Tobin
Research Manager Nancy Gaygan
Director of Production John Sanders
Director of Art Department Joan Kelly
Circulation Manager Roxanne Wilson

EDITORIAL OFFICES
Headquarters: 275 Washington St., Newton, MA 02158. (617)-964-3030. telex 127703. fax (617)-558-4506. **New York:** 249 W. 17 St., New York, NY 10011 (212)-463-6524. **Washington, D.C.:** 4451 Albemarle St. NW, Washington, DC 20016. (202)-966-7100. **Central:** 9330 LBJ Freeway, Suite 1060, Dallas, TX 75243. (214)-644-3683. **Western:** 12233 W. Olympic, Los Angeles, CA 90064. (213)-826-5818. 582 Market St., Suite 1007, San Francisco, CA 94104. (415)-981-2595. 3031 Tisch Way, Suite 100, San Jose, CA 95128. (408)-243-8838. **International:** 27 Paul St., London EC2A 4JU, England. (44-1)-628-7030. telex 914911. CPO Box 665, Tokyo, Japan. (81-3)-201-2335. fax 2135053.

DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by the Cahners Publishing Company, a Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158. William M. Platt, Chief Executive Officer; Terrence M. McDermott, President; Frank J. Sibley, Senior Vice President/GM, Boston Division; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Editorial and advertising offices: 275 Washington St., Newton, MA 02158. Published at Woodstock, IL. Annual subscription rates: U.S. and possessions: $69; Canada: $98; Japan, Australia, New Zealand: $180 air freight; Europe $157 air freight, $290 air mail. All other nations: $157 surface, $250 air mail. Reduced rate for U.S. public and school libraries: $47. Single copy: $10 in U.S. Sole agent for subscriptions in Japan is Maruzen Co. Ltd., 3-10 Nihonbashi, 2-Chome, Chuo-ku, Tokyo 103. J. sole agent for all other foreign subscriptions is J.B. Tratsart Ltd., 154A Greenford Rd., Harrow, Middlesex HA13QT, England. (44-1)-422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Circulation records are maintained at 44 Cook St., Denver, CO 80206. Phone (303)-388-4511. Second-class postage paid at Denver, CO 80206 and at additional mailing office. DATAMATION copyright 1989 by Reed Publishing USA. Ronald G. Segel, Chairman and Chief Executive Officer; Robert L. Krakoff, President and Chief Operating Officer. All rights reserved. DATAMATION is a registered trademark of Cahners Publishing Co. Reprints of articles are available; contact Frank Pruzina (312)-635-8800. Microfilm copies of DATAMATION may be obtained from University Microfilms, a Xerox Company, 300 N. Zeeb Rd., Ann Arbor, MI 48106. Printed by Graflek Press Inc. **All inquiries and requests for change of address should be accompanied by mailing label from latest issue of magazine.** Allow two months for change to be made. POSTMASTER: send address changes to DATAMATION, 44 Cook St., Denver, CO 80206.

Reaping CASE Harvests

A University of Houston survey finds small software projects to be a fertile field for CASE tools. However, the adequacy of current tools for complex software development is by no means widely accepted.

BY MARCUS LOH and R. RYAN NELSON

Obtaining satisfactory results from computer-aided software engineering (CASE) can be a lot like gardening. The size of the harvest is determined to a large extent by when and where the seeds are sown.

Productivity gains from the use of software engineering tools vary depending on the suitability of a software project and programmers' acceptance of CASE, a survey recently conducted by the University of Houston of some 40 programmers, analysts and systems designers at 12 companies reveals. Among the survey's other findings:

- Using CASE typically changes existing development methodologies.
- Training programmers and designers in the use of CASE tools is no simple task. The variety of tools and a reluctance to change development habits are major hurdles to the successful use of CASE.
- Using CASE tends to result in a shift in programming time to front-end development, such as planning and design. Moreover, its use significantly lowers the time spent on writing code and maintaining software.

Overall, survey findings illustrate the selective impact that CASE has on programmer productivity. While companies generally agreed that using CASE tools increased productivity in all phases of the systems development cycle, proficiency in a particular tool, the size of the development project and the degree of tool integration all affect the results that can be obtained.

Beyond productivity, however, improved quality of software products, standardized development techniques and better project management were cited as CASE-related benefits by most respondent companies. But the study also identifies common problems in implementing CASE and shortcomings in the current generation of tools.

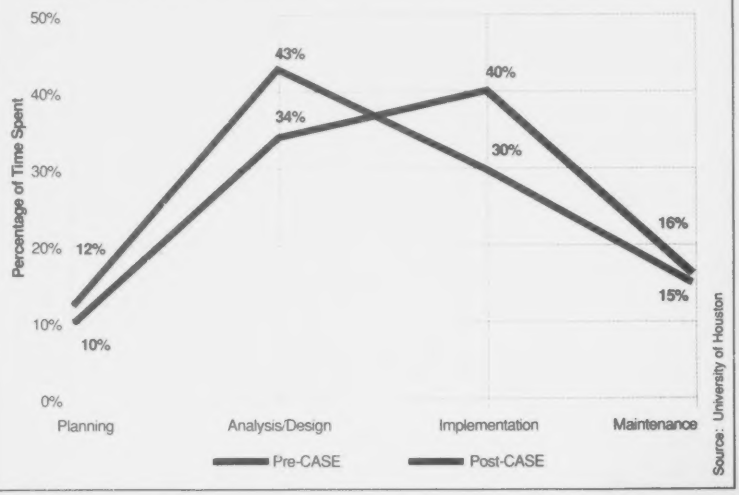
CASE tools automate tasks associated with the software development life cycle. Depending on their degree of tool integration and scope, these tools are either referred to as "toolkits" or "workbenches." For the purposes of the survey, a toolkit is defined to be a set of integrated CASE tools designed to work together to automate, or partially automate, a particular development job or a single phase of the systems development cycle. Workbenches are integrated CASE tools that assist across all phases of the systems development cycle—planning, analysis and design, implementation and maintenance.

Training Is Not Trivial

A significant finding concerned the amount of time most developers require to become adept in the use of CASE. Programmers, analysts and designers report they spend an average of 69 hours learning to use CASE tools on their own. Company-operated group-training sessions and private instruction account, on average, for another 86 hours of training. Such lengthy training requirements can impede CASE use.

Front End Tasks Consume More Staff Time

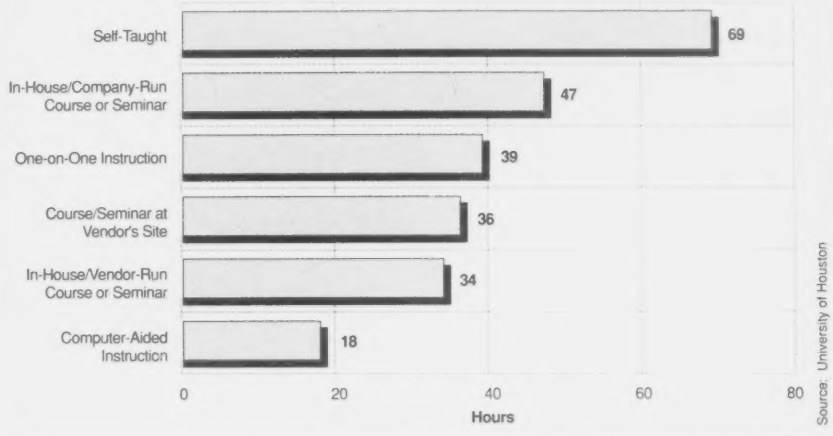
When CASE tools are employed, software development activity shifts from back-end coding and maintenance to front-end planning, design and analysis as a percentage of total time spent.



Source: University of Houston

Training Needs Consume Significant Time

Hours spent individually learning CASE tools far exceeds time in structured courses or seminars.



For instance, hefty training needs prompted Service Corp. International (SCI) to replace a CASE tool from Atlanta-based KnowledgeWare Inc. in favor of data-modeling tools from Kimberly-Clark Computer Services Inc. in Dallas. The latter tools are tailored to a fourth-generation language and data base that are familiar to SCI's programming staff.

"The learning curve was much more difficult than we thought it would be," says George Shackelford, director of management information systems for SCI, a Houston-based operator of funeral homes. "Training was expensive, the package was expensive and then we found we had to spend several months to become proficient in it."

Training needs may reflect the users' tendency to implement two or more different CASE tools. In our sample, 25 different CASE tools were used among the surveyed companies. These firms showed a more than two-to-one preference for toolkits over workbenches. All but three of the 12 companies surveyed acknowledged using two or more vendors' tools.

Reasons for CASE Failures

A lack of involvement in selecting the CASE tools by those who use them may affect training needs. Most of the programmers and analysts we surveyed did not participate in their company's tool selection. In addition, poor training is high on the list of reasons for CASE failures, says Neil Tramel, an Electronic Data Systems Corp. development manager in Houston. But, according to Tramel, the three most common reasons for failure are a staff that doesn't understand methodologies, inadequate staff training and operating without management support.

Among the reasons for tool selection, survey respondents mentioned text and graphics integration, flexibility for stand-alone or LAN-based use and suitability for particular applications.

☐ POOR DATA SHARING BY EXISTING CASE TOOLS CONFINES USE TO SMALL PROJECTS.

CASE tools primarily are applied to the front end of the systems development cycle among the companies we surveyed. Every company acknowledged using at least one tool for the analysis and design phase and 75% used planning tools. Only 50% use tools for back-end coding and maintenance phases. One-quarter of the respondents reported using CASE tools throughout the systems development cycle.

On a scale of 1 to 5 (ranging from poor to exceptional), survey respondents rated their CASE tools a favorable 3.69. For individual phases of the software development cycle, CASE tools rated weakest in implementation (3.38) and maintenance (3.40) and strongest in analysis and design (3.85). Planning tools received moderate approval, with a rating of 3.50.

The higher rankings for front-end tasks support one respondent's conclusion that CASE tools provide "significant productivity gains on simple tasks, but there are no savings for complex tasks." The greatest savings in development come from automating merely clerical functions, such as diagraming. For instance, one company reports that, using CASE, a data flow diagram that ordinarily took two to three weeks to develop manually was constructed in one to two days.

Such benefits disappear for development projects ordinarily taking more than two years to complete. On projects of up to two years, CASE appears to have been able to reduce the average number of hours spent per project by 20%. For projects over two years, however, there was no significant reduction in time.

We believe the root of this productivity decline is the difficulty current tools have in sharing data. Given the greater data-sharing requirements of complex systems, this drawback places a restriction on the use of CASE tools in larger development projects.

The companies that we interviewed indicated that this lack of, or awkward nature of, interfaces to other tools, combined with poor compatibility, was a serious shortcoming of CASE tools. Furthermore, the typically long learning curve and the lack of a facility to forecast performance of the target system were mentioned as weaknesses by most companies surveyed.

Another sign of the immature state of existing tools was reflected in the time spent in the various phases of development. Prior to the implementation of CASE tools, companies reported that 44% of development time was devoted to planning, analysis and design. After using these tools, this percentage increased to 55%.

Our conclusion is that CASE tools effectively shift manpower expenditures to the front end of the development life cycle. However, this should be viewed as a benefit. Many experts claim a higher percentage of time should be spent in front-end activities.

More than 80% of the companies interviewed reported altering their chosen methodology as a result of using CASE

tools. For example, four companies acknowledged adopting Gane and Sarson standard methodologies for data analysis and design. In fact, only two companies were able to use CASE tools with their existing methodology.

User Involvement Helps

Virtually all companies cited productivity increases in the analysis and design phase. For example, they found that information was captured quickly in joint application design sessions. Similarly, quality improvements were attributed to the enhanced user participation in analysis and design.

Respondent companies also averaged a 35% increase in productivity in the maintenance phase because applications required less rework. Having a common structure across programs made the maintenance effort much easier, they felt. Only two companies reported a reduction in productivity in the implementation and maintenance phases. Those who experienced a productivity decrease felt that less time was allocated to the latter phases and too much time to analysis and design.

Users generally indicated that CASE tools not only promoted gains in productivity but also provided consistency, facilitated communication and achieved significant savings in development time. CASE tools allowed designers to produce and maintain standardized design formats and similar screens and menus. This consistency permitted easier movement of people from one job to another. Better communication resulted from the joint analysis and design workshops at one company, allowing for better understanding by users, designers and managers. Moreover, the tools' graphic depiction of complex systems forged a common language for designers and users to discuss projects.

Better quality projects are produced more quickly after using CASE tools. This improvement is attributable to the use of diagraming and the resulting more precise data model.

Virtually all respondents asked for better interfaces and integration, reflecting a belief that there is no comprehensive tool that can handle all phases of the systems development life cycle. Even if such a product were available, respondents said, they would still be concerned about its ease of use.

Based on the findings in this survey, CASE tools have had a significant impact on the systems development process. Not only do programmers and analysts seem to become more productive they also seem to spend more of their time in the early phases of the development life cycle rather than on implementation and maintenance.

However, the unevenness of productivity gains across the development life cycle suggests that improvements are needed in tool integration and/or interproduct compatibility. The long learning curve that current products require also suggests companies must continue to devote a high level of organizational resources to CASE training. □

Marcus Loh is a graduate student in business administration, and R. Ryan Nelson an assistant professor of management information systems, at the University of Houston.

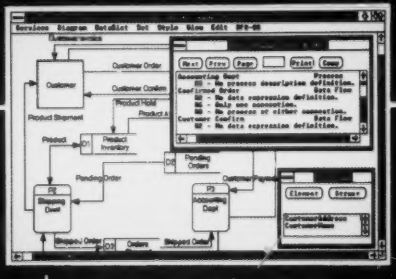
NETWORK VERSION AVAILABLE

System Architect™

A PC based
CASE tool under Microsoft® Windows

- Yourdon/DeMarco
- Gane and Sarson
- Real-Time
- Entity Relation
- Structure Charts
- Decomposition

- On-Line Rules
- Extract/Merge
- Import/Export
- Novice Mode
- Desktop Publishing



- Data Dictionary In dBASE III Plus Format
- Requirements Specifications And Tracking

NEW

- User Defined Attributes
- Test Plan, Change Request
- Spread Sheet Interface
- Object Oriented Design (Optional)

$1,395.00*

POPKIN
SOFTWARE & SYSTEMS INCORPORATED

Popkin Software & Systems, 111 Prospect St., Suite 505 Stamford, CT 06901, 203-323-3434 Fax: 203-327-7652
*30 day money back guarantee. Call for details. Volume discount available. Prices subject to change without notice. U.S.A. and Canada only. Call for pricing elsewhere. dBASE III Plus is a Trademark of Ashton-Tate. Microsoft is a Registered Trademark of Microsoft Corporation.

Circle 16 on Reader Card

The Battle For Europe

The world's vendors are jockeying for position as the battle heats up for IS rule in the single European market.

BY PAUL TATE

It was a year of furious preparation for the IS industry in Europe. Throughout 1988, companies across the globe gathered their European forces, forged strategic alliances across the region, reorganized their internal lines of command and prepared for a competitive onslaught the likes of which neither Europe—nor any other continent—has ever seen.

The increasingly realistic prospect of a single market emerging sometime after 1992 has turned Europe into a global battlefield once again. Europe's IS markets have always been noted for their fierce combination of pan-European U.S. giants, patriotic national champions and major Japanese distributors. But, in the past, the majority of clashes among them were local incidents. In 1988 all three groups took the fighting onto a European plane. It was the year that the battle for the single European market really began.

The 25 companies most likely to succeed in the new Europe make up the 1988 DATAMATION Top 25. Together, their combined IS revenues rose 16.8% in U.S. dollars to $66 billion. Because the dollar fell slightly against most European currencies—about 2 to 3%—the increase in revenues in European currencies was less than what it was when calculated in dollars. And with European merger activity high, real growth is closer to 13%.

The threshold of entry to the DATAMATION's European elite soared in 1988, however—up from $493 million in 1987 to $723 million in 1988, a massive increase of 47%. The big in Europe are getting bigger. With a total European IS market of over $90 billion in 1988, the Top 25 companies represent over two-thirds of 1988 European IS sales.

IBM Grows But Loses Share

IBM still rules the European market, with revenues almost four times larger than its nearest rival, West Germany's Siemens AG. IBM Europe's IS revenues were up 10.3% in 1988 at $20.5 billion—the first time the company has burst through the $20 billion barrier in Europe.

Last year Big Blue's European revenues accounted for 34% of IBM's corporate sales and 43% of its profits. While the company watched profits tumble by 27% and revenues dip by $184 million in its U.S. operations, IBM Europe pushed income up 6% to $2.3 billion. The importance of the European operations to IBM's global health is increasing—but it hasn't been easy.

IBM managed to claw back some growth during 1988 in most of its major markets after a dreadful 1987. The revenue improvement was due in part to widespread interest in its AS/400 systems and an increasing number of lucrative systems integration and networking deals. Even so, its share of the European Top 25 revenues is down again to 31% from 33% in 1987 and 42% only four years ago in 1984.

Big Blue's biggest sigh of relief came in West Germany, where its oldest and largest foreign subsidiary managed to improve sales 5.5% after dropping 3.5% of revenues in 1987. Last year, it brought in $4.2 billion worth of business—accounting for 20.4% of IBM's European sales.

In France, the second largest market for IBM, revenues were up 8.0% after a flat 1987. The United Kingdom's position as IBM's European number three market with $3 billion in revenues is now in jeopardy, however. The Italian market is booming, and after a 13.5% rise in 1987 and another 14% in 1988, IBM Italy is now only a hairbreadth away from toppling the U.K. subsidiary, with Italian sales reaching $2.99 billion last year.

INTERNATIONAL

EUROPE: The world's vendors are jockeying to be in position for the single European market ____ 68–3

ITALY: Benetton's visionary senior management has used IS to sharpen the company's competitive edge ____ 68–15

EUROPE: Managers are beginning to come to grips with executive information systems ____ 68–17

INNOVATIONS: NEC's new supercomputers; ozone-friendly printers from Memorex Telex ____ 68–20

Europe's other booming market—Spain—provided IBM with 16% more sales than in 1987, and in the Netherlands, where revenues plummeted by 18% in 1987, the Dutch subsidiary regained some momentum and reported a 10% increase for 1988 to $940 million (see chart, "IBM Europe's Major Markets").

Japanese Firms Enter the Top 25

IBM is one of 10 U.S. companies on this year's European ranking, with 13 Europeans and for the first time two Japanese firms—printer specialist Canon Inc. at $1.05 billion and plug-compatible mainframe supplier Hitachi Ltd. with $824.8 million. The combined European revenues of the 13 European firms amounted to over $28 billion, accounting for 43% of the total revenues of the Top 25 companies. That's down a little from the 46% share enjoyed in 1987, but more than the 41% garnered in 1986.

The Japanese are a new factor. Selling its plug-compatible manufacturers machines through National Advanced Systems Corp., Comparex Informationssysteme GmbH and Ing. C. Olivetti & Co. SpA, Japan's Hitachi has become a powerful force in European mainframe sales. This may increase further when Comparex completes its acquisition of the European operations of NAS later this year. The coordinated sales operations should clear the way for further market growth before IBM muddies the waters once again with its new Summit mainframe line.

While both the Japanese companies in the ranking have shown strong progress in Europe over the last year, inadequate geographical breakdowns from the Japanese companies have precluded their inclusion in previous rankings.

Hitachi and Canon are two of the six new names on the 1988 Top 25. Also featured this year is Finland's aggressive IS group Nokia Data Systems, which acquired the Information Systems Division of Sweden's LM Ericsson in early 1988. In the first year, the consolidated revenues of the new Nokia Corp. reached $1.2 billion, putting it in 14th position.

Prime Computer Inc. enters the table at number 18 with revenues of $909 million, up substantially over 1987 due to its acquisition of Computervision Corp. Control Data Corp. has jumped back onto the ranking in 1988 after an absence of one year, this time at number 23, with revenues of $781 million, and the current darling of Wall Street, U.S. PC supplier COMPAQ Computer Corp., has burst in at number 25 after raging growth in Europe as well as the United States.

Barriers to Entry

The rising entry threshold took its toll on companies that were nevertheless performing well. Altogether, six firms are no longer on the ranking this year. Apart

The Top 25 Suppliers in Europe

Ten U.S. companies rank among the biggest vendors.

1988 RANK	1987 RANK	COMPANY	COUNTRY	1988 EUR. IS REV.	% CHG. FROM 1987 $/AAC*	TOTAL IS REV.	% CHG. FROM 1987 $/AAC*	EUR. % OF TOTAL IS/ % CHG.
1	1	IBM	U.S.	$20,520.0	10.3/—	$55,002.8	8.7/—	37/0
2	2	Siemens	W. Germany	5,296.4	6.7/4.3	5,951.0	4.4/2.0	89/2
3	4	Digital Equipment	U.S.	4,422.5	29.0/—	12,284.7	18.2/—	36/3
4	3	Olivetti	Italy	4,396.6	15.6/16.0	5,427.9	17.0/17.5	81/(1)
5	6	Groupe Bull	France	4,025.5	11.1/10.1	5,296.7	6.7/5.7	76/3
6	5	Nixdorf	W. Germany	2,831.8	6.8/4.3	3,044.9	7.9/5.4	93/(1)
7	7	Unisys	U.S.	2,639.0	14.0/—	9,100.0	2.2/—	29/3
8	9	Hewlett-Packard	U.S.	2,331.0	29.5/—	6,300.0	26.0/—	37/1
9	8	NV Philips	Netherlands	2,207.7	7.4/4.8	2,794.6	7.4/4.8	79/0
10	10	STC	U.K.	2,061.3	19.3/10.1	2,425.1	14.2/4.9	85/4
11	11	NCR	U.S.	1,756.9	7.9/—	5,324.0	4.7/—	33/1
12	13	Alcatel	France	1,647.4	29.5/26.1	1,716.0	(16.5)/(18.5)	96/34
13	15	Societe Generale	France	1,173.7	21.0/19.9	1,222.6	26.0/24.9	96/(4)
14	—	Nokia	Finland	1,165.1	179.1/165.8	1,165.1	179.1/165.8	100/0
15	16	Atlantic Computers	U.K.	1,113.5	16.4/6.9	1,341.6	30.5/19.9	83/(10)
16	—	Canon	Japan	1,051.4	47.8/31.0	3,391.6	43.0/26.8	31/1
17	21	Apple	U.S.	931.2	70.1/—	4,434.1	45.8/—	21/3
18	—	Prime	U.S.	908.6	186.5/—	1,594.0	65.9/—	57/24
19	19	Wang	U.S.	891.6	8.4/—	3,074.4	0.9/—	29/2
20	—	Hitachi	Japan	824.8	19.5/5.9	8,247.6	31.5/16.5	10/(1)
21	22	Cap Gemini Sogeti	France	800.7	46.7/45.4	976.5	43.1/41.9	82/2
22	24	Amstrad	U.K.	782.9	14.1/4.8	841.8	15.3/5.9	93/(1)
23	—	Control Data	U.S.	781.0	(6.2)/—	3,524.3	9.4/—	22/(4)
24	14	Inspectorate Int'l	Switzerland	725.9	0.4/(1.9)	1,230.3	0.4/(1.9)	59/0
25	—	Compaq	U.S.	723.0	146.1/—	2,065.6	68.7	35/11

Source: DATAMATION.
All currency figures are in millions.

from Ericsson, the other company that has merged is Honeywell Bull Inc., now controlled worldwide by France's Groupe Bull, which ranks at number five on the list.

The only company that dropped in ranking due to reduced sales was Netherlands-based Memorex Telex NV, which reported European revenues down 18% at $685.9 million. By contrast, West Germany's Mannesmann Kienzle AG had a booming year with IS sales up 16%. But its $717 million sales figure was too low to place the company on the table and Mannesmann slipped from 20 in 1987 to number 26. Leasing company Econocom International BV slipped from number 23 also off the table to number 29 despite revenues being up 26% to $664 million, while Amdahl Corp. reported revenues up 13% to $559 million but dropped from last year's number 25 slot down to number 32 in 1988.

Reporting solid growth and booming revenues last year and approaching the new threshold were Xerox Corp.'s European joint venture, Rank Xerox, which is doing well with revenues up to $677 million, and Commodore International Ltd., which pushed its European sales up to $621 million in 1988.

Nine companies ascended in rank on the table last year, four slipped down and six remained in the same position. The biggest jump was Apple Computer Inc.'s surge from number 21 in 1987 to number 17 in 1988. This reflects the burgeoning PC market in Europe, which also pushed U.K.-based PC maker Amstrad PLC up two places from number 24 to number 22, and also accounts for Compaq's sudden arrival at number 25. Also heading upward by two places was French bank Société Générale, reaching number 13. Société Générale has two main interests in the IS sector—its Europe Computer Systems leasing operation and the SG2 software and services company. ECS performed particularly well, and between the companies they pushed the bank's IS revenues up 21% to $1.2 billion.

U.S. % OF TOTAL IS/ % CHG.	NET INCOME	1988 EMPLOYEES	FISCAL YEAR END
42/(4)	5,806.0	387,112	Dec.
10/(2)	792.1	353,000	Sept.
48/(3)	1,209.1	124,400	July
10/1	273.5	57,560	Dec.
[illegible]/(3)	50.9	45,557	Dec.
5/1	14.8	31,037	Dec.
54/(2)	680.6	93,000	Dec.
48/(3)	816.0	87,000	Oct.
14/0	534.1	310,300	Dec.
7/(2)	264.9	33,848	Dec.
42/(3)	439.3	60,000	Dec.
0/(31)	497.9	127,000	Dec.
0/0	6.9	1,137	Dec.
0/0	259.7	44,600	Dec.
15/10	65.8	1,431	Dec.
30/(2)	229.5	40,740	Mar.
66/(6)	419.3	10,836	Sept.
43/(14)	19.0	12,500	Dec.
57/(3)	50.1	31,255	June
11/1	1,060.3	161,000	Mar.
18/(2)	67.5	12,000	Dec.
5/2	165.1	1,644	June
71/(4)	1.7	33,657	Dec.
40/—	90.2	7,698	Dec.
61/(13)	255.2	6,000	Dec.

* Actual accounting currency.

Surge Continues

Moving up by one point was Digital Equipment, which has pushed Olivetti out of the number three position. This is the second year that Digital has proved how much life there is in the European market. In 1987 it reported an increase of 27% in sales and in 1988 it added a 29% surge to its European business. Two of Europe's mini makers—Norsk Data AS in Norway and Nixdorf Computer AG in West Germany — suffered, however, with losses of $42 million at Norsk and profits below expectations at Nixdorf.

Also up one position each were Alcatel NV (now at number 12), U.K. leasing company Atlantic Computers PLC (at number 15), France's Cap Gemini Sogeti (at number 21), France's Groupe Bull (which replaced Nixdorf at number 5) and Hewlett-Packard Co. (at number 8).

Sliding down the list were Nixdorf, Olivetti and NV Philips' GL each by one place, and Swiss-based leasing group Inspectorate International Ltd. fell by 10 places to its rightful position at number 24 (1987 figures have been restated).

Widespread Restructuring

Corporate reorganization characterized many of the European companies during 1988. In Scandinavia, Nokia Data spent the year merging its activities with the data systems division of Ericsson Information Systems. In the Netherlands, Philips began to build a new corporate organization around four core businesses—one of them information technology—and trying to coordinate its worldwide marketing and manufacturing activities. In addition, Alcatel, registered in Amsterdam but headquartered in Paris, is still interweaving Compagnie Générale Electricité's IS operations and ITT's European network of offices.

Both Olivetti and Siemens announced massive restructuring programs toward the end of the year. Olivetti is being divided into three main subsidiaries: Systems and Networks, Office, and Information Services. By 1994, Olivetti's new joint managing director Vittorio Cassoni expects them to be eligible for listings on the Italian stock exchange.

West Germany's Siemens, meanwhile, plans to divide up its massive product groups into between 15 to 20 independent business units by the end of September. The process will involve shuffling 9,000 staff members around the organization.

This year also featured a significant number of mergers and acquisitions, especially in the software and services sector.

A Shift in Spending

The biggest problems the European contenders are going to have to face over the next year or two may not be in Brussels, where the European Commission is thrashing out the details of the new market structure. The problems may well be in the thousands of IS divisions, user departments and retail outlets found in 17 countries. European market growth is beginning to show signs of slowing down. Not because European companies are not buying as many products, but because they are looking for more value for every

mark, franc and pound they spend.

And the balance of spending has shifted markedly over 1988. A DATAMATION Price Waterhouse International user survey shows 19% fewer French and 6% fewer U.K. companies planning to up their hardware budget for 1989, compared with the first quarter of 1988. Most of the money is going into software—developed both in and out of house—and on networks.

As hardware increasingly becomes a commodity product, and the open systems standards movement that began in Europe in the late 1970s and early 1980s creates new dynamics in the European hardware industry market, the competitive focus is on electronic trading links, network services and mission critical systems as the factors for success in a single market.

But both international hardware and software companies alike may have to face a much more difficult problem in Europe over the next few years—the possible emergence of a European trading bloc and all of its incumbent trade barriers. The threat of a "Fortress Europe" developing to protect European companies in the transition to a single market became a potent issue in 1988. It's an issue that many U.S. observers treat seriously and some feel has major global ramifications.

"It seems to me that a common market is inherently discriminatory," said one-time U.S. Secretary of State Henry Kissinger at a recent European conference held by International Data Corp. of Framingham, Mass. "Its external barriers are higher than its internal barriers. That's what makes it a common market. You can negotiate them down, but you must do so from a similar position. I don't think the world of the future will be a matter of GATT [General Agreement on Tariffs and Trade] negotiations between countries, but between trading blocs."

The world's major IS companies are consolidating their positions in Europe before that happens. This year will reveal who wins the first few skirmishes in the battle for Europe.

Results for non-U.S. companies are converted into dollars using Organization for Economic Cooperation and Development (OECD) average exchange rates. For those currencies not part of the OECD, exchange rate information was provided by the International Monetary Fund. For 1988, equivalents to $1 in these currencies were as follows: European Currency Unit, ECU1.15; Finland, Fmk4.18; France, FR5.95; Italy, L1,301.68; the Netherlands, G1.98; Norway, Nkr6.52; Sweden, Skr6.13; Switzerland SFR1.46; the United Kingdom £0.56; West Germany, DM1.76.

The Top 25 European Companies

Siemens and Olivetti lead the pack this year.

1988 RANK	COMPANY	COUNTRY	1988 IS REVENUE	% CHG. FROM 1987	% CHG. FROM 1987 IN AAC*
1	Siemens	W. Germany	$5,951.0	4.35	2.0
2	Olivetti	Italy	5,427.9	17.05	17.5
3	Groupe Bull	France	5,296.7	6.69	5.7
4	Nixdorf	W. Germany	3,044.9	7.92	5.4
5	NV Philips	Netherlands	2,794.6	7.42	4.8
6	STC	U.K.	2,425.1	14.18	4.9
7	Memorex Telex	Netherlands	2,078.5	99.64	94.9
8	Alcatel	France	1,716.0	(16.51)	(18.5)
9	Atlantic Computers	U.K.	1,341.6	30.46	19.9
10	Inspectorate Int'l	Switzerland	1,230.3	0.43	(1.9)
11	Societe Generale	France	1,222.6	26.03	24.9
12	Nokia	Finland	1,165.1	179.13	165.8
13	Cap Gemini Sogeti	France	976.5	43.12	41.9
14	Econocom	Netherlands	897.0	33.03	29.8
15	Amstrad	U.K.	841.8	15.28	5.9
16	Mannesmann	W. Germany	779.0	13.56	10.9
17	Comparex	W. Germany	614.5	15.77	13.1
18	Racal Electronics	U.K.	554.1	0.91	(7.3)
19	Finsiel	Italy	545.4	28.60	29.1
20	Norsk Data	Norway	450.2	6.53	3.1
21	Sema Group	U.K.	375.1	90.21	74.6
22	SD-Scicon	U.K.	366.4	27.67	17.3
23	Sligos	France	343.1	47.51	46.2
24	Logica	U.K.	269.9	38.69	27.5
25	GSI	France	262.8	14.01	13.0

Source: DATAMATION, company reports. *Actual accounting currency.
All currency figures are in millions.

IBM's Seven Major Sources of Revenue in Europe

West Germany is IBM's biggest market in Europe.

IBM SUBSIDIARY	1988 LOCAL REV.	1988 LOCAL REV. AAC*	% CHG. FROM 1987	1988 TOTAL REV. AAC*	% CHG. FROM 1987 AAC*	NET INCOME	NET INCOME AAC*	% CHG. FROM 1987 AAC*
West Germany	$4,181.0	DM7,342	5.5	DM11,372	(1.5)	$367.3	DM645	18.3
France	3,379.6	Fr20,129	8.0	Fr38,169	1.2	388.2	Fr2,312	3.1
United Kingdom	3,078.3	£1,730	5.1	£3,874	11.2	581.9	£327	3.8
Italy	2,994.6	L3,898,000	14.0	L6,570,000	21.9	442.5	L576,000	26.0
Spain	1,133.7	Pta132,071	16.0	Pta187,090	5.4	183.7	Pta21,396	(3.6)
Netherlands	940.8	G1,860	10.1	G3,243	0.8	68.3	G135	(35.4)
Sweden	798.7	Skr4,895	12.2	Skr9,024	18.1	64.8	Skr397	5.6

Source: IBM Europe, Paris.
All currency figures are in millions; all exchange rates are OECD average rates for 1988. *Actual accounting currency.